

WHAT IS CLAIMED IS:

1. An endoscope system, comprising:

an endoscope having an elongated insertional part capable of being inserted into a living body;

an administering means for use in administering a fluorescent substance, which emits fluorescence with wavelengths in a first infrared spectrum to be transmitted by a living tissue more efficiently than light with wavelengths in the visible and ultraviolet spectra, and which is apt to be accumulated in a lesion, to the inside of a living body;

an excitation light irradiating means for irradiating excitation light with wavelengths in a second infrared spectrum different from the first infrared spectrum to the living tissue inside the living body to which the fluorescent substance has been administered;

an imaging means, incorporated in said endoscope, for cutting off excitation light and producing a fluorescence image using fluorescence with wavelengths in the first infrared spectrum emanating from the fluorescent substance;

a signal processing means for processing a signal output from said imaging means and producing a video signal; and

a display means for displaying an image represented by the video signal.

2. An endoscope system according to claim 1, wherein said fluorescent substance is an antibody labeled by indocyanine green.

3. An endoscope system according to claim 1, wherein said excitation light irradiating means irradiates excitation light intermittently, further comprising a subtracting means for subtracting a background image formed by said imaging means when excitation light is not irradiated from a fluorescence image formed by said imaging means when the excitation light is irradiated.

4. An endoscope system according to claim 1, wherein said endoscope is an electronic endoscope having said imaging means located in the distal part of said insertional part.

5. An endoscope system according to claim 1, wherein said endoscope is a camera-mounted endoscope composed of an optical endoscope having an image guide over which a fluorescence image is propagated and a TV camera mounted on an eyepiece unit of said optical endoscope and having an imaging device for photoelectrically converting the fluorescence image therein.

6. An endoscope system, comprising:

an endoscope having an elongated insertional part capable of being inserted into a living body;

a light source means for simultaneously irradiating excitation light with wavelengths in a first infrared

spectrum for exciting a fluorescent substance administered to a living tissue, and light with wavelengths in the visible spectrum;

a separating means for separating fluorescence with wavelengths in a second infrared spectrum, which includes at least part of the spectrum of wavelengths of excitation light for exciting a fluorescent substance and is different from the first infrared spectrum, from light stemming from the living tissue;

a first imaging means for imaging the fluorescence separated by said separating means; and

a second imaging means for imaging light with wavelengths in the visible spectrum.

7. An endoscope system according to claim 6, wherein said fluorescent substance is an antibody labeled by indocyanine green.

8. An endoscope system according to claim 6, wherein said separating means is a dichroic mirror, and said second imaging means includes at least three imaging devices different from the one of said first imaging means.

9. An endoscope system according to claim 6, wherein said separating means is a mosaic filter, and said first imaging means and second imaging means are realized with a common imaging means.

10. An endoscope system according to claim 6, wherein said separating means includes a dichroic mirror, and said

first imaging means includes an image intensifier.

11. An endoscope system according to claim 9, wherein said endoscope is an electronic endoscope having said separating means and common imaging means located in the distal part of said insertional part.

12. An endoscope system according to claim 9, wherein said separating means, first imaging means, and second imaging means are located in a TV camera to be mounted on an eyepiece unit of an optical endoscope having an image guide.

13. An endoscope system, comprising:

an endoscope having an elongated insertional part capable of being inserted into a living body;

an administering means for use in administering a fluorescent substance that emits fluorescence with wavelengths in a first infrared spectrum to be transmitted by a living tissue more efficiently than light with wavelengths in the visible and ultraviolet spectra and that is apt to be accumulated in a lesion;

an excitation light irradiating means for irradiating excitation light with wavelengths in a second infrared spectrum different from the first infrared spectrum to the living tissue inside the living body to which the fluorescent substance has been administered;

a visible light irradiating means for irradiating light with wavelengths in the visible spectrum to the living tissue through said endoscope;

a first imaging means, incorporated in said endoscope, for cutting off excitation light and forming a fluorescence image using fluorescence with wavelengths in the first infrared spectrum emanating from said fluorescent substance;

a second imaging means, incorporated in said endoscope, for imaging light with wavelengths in the visible spectrum;

a signal processing means for processing signals output from said first and second imaging means and producing a video signal; and

a display means for displaying an image represented by the video signal.

14. An endoscope system according to claim 13, further comprising a control means for controlling the output level of said first imaging means on the basis of an output signal of said second imaging means.

15. An endoscope system according to claim 14, wherein said control means includes an amount-of-light control means for controlling amounts of light output from said excitation light irradiating means and visible light irradiating means.

16. An endoscope system according to claim 14, wherein said control means includes a gain control means for controlling a gain to be provided by an amplifying means for amplifying an image signal produced by said first imaging means.

17. An endoscope system according to claim 13, further comprising an image normalizing means for extracting a

reference image depicted by light with wavelengths of 600 nm or longer from an image formed by said second imaging means, and normalizing a fluorescence image formed by said first imaging means relative to the reference image.

18. An endoscope system according to claim 13, further comprising a marker producing means for producing markers to be displayed at positions in a screen, which are determined on the basis of the luminance levels of a fluorescence image formed by said first imaging means and associated with regions concerned, and an image superimposing means for superimposing the markers on a visible light image formed by said second imaging means.

19. An endoscope system according to claim 13, wherein at least one color is assigned to a fluorescence image formed by said first imaging means, at least one color is assigned to a visible light image formed by said second imaging means, and the images are displayed on said display means.

20. An endoscope system according to claim 13, wherein said first imaging means and second imaging means share the same imaging device.

21. An endoscope system according to claim 20, further comprising a diaphragm means inserted to an optical path linking the living tissue and said imaging device, wherein said diaphragm means is composed of a visible light transmission area for transmitting visible light and a

visible light non-transmission area that does not transmit visible light but transmits light with wavelengths in the first infrared spectrum and that has a larger transmission field than said visible light transmission area.

22. An endoscope system according to claim 13, further comprising a switching means for switching excitation light and visible light and irradiating selected light to the living tissue, wherein the amounts of excitation light and visible light are controlled synchronously with the switching.

23. An endoscope system according to claim 13, wherein an image signal representing a fluorescence image formed by said first imaging means and an image signal representing a visible light image formed by said second imaging means are switched and then input to said signal processing means, and said signal processing means controls the gain of an image signal synchronously with switching of the fluorescence image and visible light image to be input.

24. An endoscope system according to claim 20, further comprising a switching means for switching excitation light and visible light and irradiating selected light to the living tissue, and a variable diaphragm means inserted to an optical path linking the living tissue and said imaging device, wherein an amount of light to be passed by said variable diaphragm means is controlled according to the switching.

25. An endoscope system according to claim 20, further comprising a switching means for switching excitation light and visible light and irradiating selected light to the living tissue, and an integrating means for integrating a current level of an image signal produced by said imaging device and a level thereof attained during an immediately preceding frame, wherein weighting that is the integration is controlled according to the switching.

26. An endoscope system according to claim 20, further comprising a switching means for switching excitation light and visible light and irradiating selected light to the living tissue, wherein control is given so that: when an image signal representing a fluorescence image is output from said imaging device according to switching by said switching means, the image signal is passed to a filter circuit responsible for smoothening; and when an image signal representing a visible light image is output from said imaging device, the image signal is passed to a filter circuit responsible for contour enhancement.

27. An endoscope system according to claim 13, wherein said excitation light irradiating means and visible light irradiating means irradiate light output from a lamp, which glows in a spectrum including the first infrared spectrum and visible spectrum, as color sequential light to the living tissue, because a first filter and second filter for transmitting light with wavelengths in two spectra



within the visible spectrum, and a third filter for transmitting excitation light with wavelengths in one spectrum different from the two spectra within the visible spectrum and in the first infrared spectrum are arranged successively on the optical path.

28. An endoscope system according to claim 27, wherein said signal processing means produces a video signal representing a fluorescence image during one frame required for production of a video signal representing a color image of one frame under irradiation of color sequential light.

29. An endoscope system according to claim 13, wherein the excitation light and visible light are irradiated simultaneously to the living tissue.

30. An endoscope system according to claim 29, wherein said first and second imaging means can simultaneously produce a fluorescence image and a visible light image depicted by light with wavelengths in the visible spectrum.

31. An endoscope system, comprising:

an endoscope having an elongated insertional part capable of being inserted into a living body;

a light source means for irradiating illumination light containing excitation light with wavelengths in a first infrared spectrum which causes a fluorescent substance to be administered to a living tissue to fluoresce;

a first imaging means for producing a fluorescence image depicted by light with wavelengths in a second

infrared spectrum different from the first infrared spectrum of wavelengths of excitation light for exciting a fluorescent substance administered to the living tissue;

a second imaging means for forming a reflected light image depicted by reflected light of the illumination light stemming from the living tissue; and

a display means for displaying the fluorescence image and reflected light image formed by said first and second imaging means while superimposing the fluorescence image on the reflected light image.

32. An endoscope system according to claim 31, wherein said second imaging means forms a reflected light image using reflected light of excitation light.

33. An endoscope system according to claim 31, wherein said second imaging means forms a reflected light image simultaneously with a fluorescence image to be formed by said first imaging means.

34. An endoscope system according to claim 31, wherein said display means displays a fluorescence image and reflected light image in mutually different colors.